PATENT ABSTRACTS OF JAPAN

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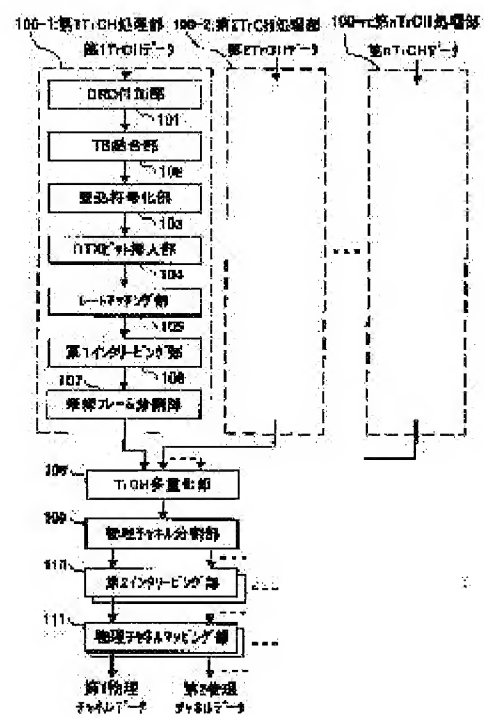
(54) DATA TRANSMITTER, DATA RECEIVER, DATA TRANSMISSION METHOD AND DATA RECEPTION METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a data transmitter, a data receiver, a data transmission method and a data reception method by which rate matching processing is always applied to a bit length of a prescribed size thereby preventing the processing quantity from being increased even when number of transport blocks sent through a transport channel and a transport block size are changed.

SOLUTION: A CRC attach section 101 through a convolution coding section 103 apply coding processing to transport channel data (TrCH data) for error correction. A DTX(Discontinuous Transmission) bit insertion section 104 inserts DTX bits to fill in a bit number of a difference to the TrCH data when the number of the TrCH data after coding processing has the difference, that is, is less than a predetermined maximum value. A rate matching section 105 decides number of bits for mapping the TrCH data after the insertion with data on a physical channel having a spread rate designated by a host layer. A physical channel mapping section 111 maps the TrCH data of the bit number with the data on the physical channel.



CLAIMS

[Claim(s)]
[Claim 1]The data source comprising:
A means to perform coding processing for an error correction to two or more transport channel data.
A means to insert a DTX bit for burying the number of bits of the difference in transport channel data when the number of bits of transport channel data after said coding processing is less than the maximum defined beforehand.
A means to perform rate matching which determines the number of bits which maps transport channel data after said insertion as a physical channel of a dispersion ratio specified from the upper layer.
A means to map transport channel data according to said number of bits on a physical channel.

[Claim 2]A means to perform coding processing for an error correction to transport channel data characterized by comprising the following, and each transport channel data after said coding processing.
A means to insert a DTX bit for burying the number of bits of that difference in transport channel data when the number of bits of this data is less than the maximum defined beforehand.
A means to perform rate matching which determines the number of bits which maps each transport channel data after said insertion as a physical channel of a dispersion ratio specified from said upper layer based on dignity of each transport channel specified from the upper layer.
A means to multiplex each transport channel data outputted from this means.
A means to map transport channel data after multiplexing according to said number of bits on a physical channel.

[Claim 3]A data receiver comprising:
A means to perform RETODE matching which returns transport channel data mapped in the data source according to claim 1 to data in front of rate matching in said data source.
A means to consider that the number of bits of that difference is a DTX bit, and to delete it when the number of bits of transport channel data after said RETODE matching is less than the maximum defined beforehand, and a means to perform decoding processing for an error correction to transport channel data outputted from this means.

[Claim 4]A data receiver comprising:
A means to separate transport channel data mapped in the data source according to claim 2.

A means to perform RETODE matching which returns each transport channel separated by this means based on dignity of each transport channel specified from the upper layer to data in front of rate matching in said data source.
A means to consider that the number of bits of the difference is a DTX bit, and to delete it when the number of bits of each transport channel data after said RETODE matching is less than the maximum defined beforehand.
A means to perform decoding processing for an error correction to each transport channel data outputted from this means.

[Claim 5]A base station device possessing the data source according to claim 1 or 2.
[Claim 6]A mobile station possessing the data receiver according to claim 3 or 4.
[Claim 7]Coding processing for an error correction is performed to two or more transport channel data, When the number of bits of transport channel data after this processing is less than the maximum defined beforehand, A DTX bit for burying the number of bits of the difference is inserted in transport channel data, Rate matching which determines the number of bits which maps transport channel data after this insertion in a physical channel of a dispersion ratio specified from the upper layer is performed, A data transmission method mapping transport channel data according to said number of bits on a physical channel.
[Claim 8]Transport channel data mapped in the data transmission method according to claim 7, RETODE matching returned to data in front of rate matching in said data transmission method is performed, When the number of bits of transport channel data after this RETODE matching is less than the maximum defined beforehand, A data receiving method performing decoding processing for an error correction to transport channel data which considered that the number of bits of that difference was a DTX bit, deleted it, and passed through this deletion.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]A mobile station of the information-and-telecommunications terminal unit etc. with which this invention was provided with the car telephone machine and the portable telephone, portable telephone function, and computer function in the mobile communications system with which the CDMA (Code Division Multiple Access) method was applied, And it is related with the data source, the data receiver and data transmission method, and data receiving method which are applied to a mobile station, the base station device which performs radio, etc.
[0002]
[Description of the Prior Art]That the channel-coding method in the mobile communication system of the third generation was indicated to be to TS25.212 of 3GPP is known. Get down and about channel coding of a circuit. The art of fixed position which considers the position at the time of multiplexing two or more Transport channel (the following TrCH and notation) as immobilization, and the art of flexible position which makes a position variable are known.
[0003]The combination of the plurality TrCH received in the mobile station which gets down from a base station device and receives a line signal, In order to perform Blind Transport format detection (the following BTFD and notation) which judges the formats (the size of Transport block, the multiplexed number of Transport block, etc.) of each TrCH without explicit information, The direction which applied fixed position can make reception easy.

[0004]Drawing 5 is a block diagram showing the composition of the conventional data source.
[0005]It gets down in fixed position and the data source shown in this drawing 5 performs channel-coding processing. However, although the following explanation shows the case where convolutional code-ized processing of the coding rates 1/3 is applied, as coding processing of an error correction, it is also the same as when convolutional code-ized processing of the coding rates 1/2 and Turbo coding processing of the coding rates 1/3 are applied.
[0006]this data source -- the [the 1st -] -- as opposed to each of nTrCH data -- the [the 1st of an identical configuration -] -- in each of the nTrCH treating part 500-1 - 500-n, Processing explained by the after-mentioned is performed by the CRC adjunct 501, the TB (Transport block) bond part 502, the convolutional code-ized part 503, the rate matching part 504, the DTX bit inserting part 505, the 1st interleaving part 506, and the radio frame dividing part 507. Then, TrCH multiplexing is performed by the TrCH multiplexing part 508, and processing explained by the after-mentioned in the physical channel dividing part 509, the 2nd interleaving part 510, and the physical channel-mapping part 511 is performed as a single data row.
[0007]the [first, / the 1st -] -- operation of the nTrCH treating part 500-1 - 500-n is explained on behalf of the 1st TrCH treating part 500-1.
[0008]In the CRC adjunct 501, addition of a CRC bit to each TB in TrCH data is performed.
[0009]In the TB bond part 502, TB to which the CRC bit was added by the CRC adjunct 501 is combined to a single data row.
[0010]In the convolutional code-ized part 503, after adding an 8-bit tail bit to the data row from the TB bond part 502, convolutional code-ized processing of the coding rates 1/3 is performed.
[0011]In the rate matching part 504, the number of bits which maps a TrCH data row is determined as the physical channel of the dispersion ratio specified from the upper layer based on RM (Rate matching attribute) specified from the upper layer.
[0012]This determined number of bits is used by mapping in the physical channel-mapping part 511. A rate matching algorithm shall follow what was indicated to TS25.212.
[0013]The variation of the number of bits before and behind rate matching, in TrCH data -- an interleave cycle -- {-- it being determined on the basis of the case where the transmission data volume of per TTI(Transmission Time Interval)} serves as the maximum, and, the [for example,] -- the number of bits from which data volume R (N^{TTI}_i) after the rate matching to transmission data volume N^{TTI}_i per TTI of iTrCH data becomes $R(N^{TTI}_i)/N^{TTI}_i=C_i$ is outputted.
[0014]In the DTX bit inserting part 505, when the number of bits after the rate matching of TrCH data is less than the maximum, a part for the number of bits of the difference is inserted as a DTX (Discontinuous Transmission) bit.
[0015]In the 1st interleaving part 506, block interleave over between two or more radio frames is performed to the TrCH data from the DTX bit inserting part 505.
[0016]In the radio frame dividing part 507, division into every data row transmitted by the radio frame for 10 ms each is performed.
[0017]the [thus, / the 1st -] -- every processed by the nTrCH treating part 500-1 - 500-n -- TrCH data is outputted to the TrCH multiplexing part 508.
[0018]Multiplexing processing of each TrCH data is performed in the TrCH multiplexing part 508.
[0019]In the physical channel dividing part 509, the transmission data to each code in the case of performing multi-code transfer is divided to multiplexing data.
[0020]In the 2nd interleaving part 510, block interleave within the data transmitted within 10 ms is performed to the output data from the physical channel dividing part 509.

[0021]In the physical channel-mapping part 511, the data row from the 2nd interleaving part 510 is arranged to up to a physical channel according to the above-mentioned number of bits.
[0022]here -- the -- the data flow in the convolutional code-ized part 503, the rate matching part 504, and the DTX bit inserting part 505 which process iTrCH data is shown in drawing 6, and the explanation is given.
[0023]To the convolutional code-ized processing in the convolutional code-ized part 503, the number of bits inputted at the time of TF(Transport Format) =j which becomes settled in the size of TB, the multiplexed number of TB, etc. is made into $N_{i \text{ and } j}$, as shown in drawing 6 (a).
[0024]Here, $N_{i \text{ and } j}$ shall contain a tail bit. At this time, from the convolutional code-ized part 503, as shown in (b), the bit string of $N_{i \text{ and } j}$x3 is outputted.
[0025]In the rate matching processing in the rate matching part 504, as shown in (c), bit manipulation which becomes x($N_{i,j}$x3) Ci=($N_{i,j}$x3) +delta$N_{i \text{ and } j}$ is performed for every TF.
[0026]In the DTX bit inserting part 505, as shown in (d), the DTX bit for [used as $N_{i, DTX}$=($N_{i, max}$x3) +delta$N_{i, max}$-($N_{i,j}$x3)+delta$N_{i, \text{and } j}$] the number of bits is inserted.
[0027]
[Problem(s) to be Solved by the Invention]However, in the conventional device, since it is necessary to the data row of the different number of bits for every TF of each TrCH to perform rate matching processing of a pattern which is different in each, there is a problem that a throughput will increase.
[0028]Since it is necessary to perform RETODE conducts matching corresponding to all the TF when getting down and performing BTFD in channel decoding in the reception of a circuit especially, a throughput will increase.
[0029]This invention is made in view of this point, and is a thing.
the purpose, even if the number of transport blocks and transport block size which are come out of and transmitted change, It is providing the data source and the data receiver which can always perform rate matching processing to the bit length of certain size, and can prevent increase of a throughput by this and a data transmission method, and a data receiving method.

[0030]
[Means for Solving the Problem]A means by which the data source of this invention performs coding processing for an error correction to two or more transport channel data, A means to insert a DTX bit for burying the number of bits of the difference in transport channel data when the number of bits of transport channel data after said coding processing is less than the maximum defined beforehand, A means to perform rate matching which determines the number of bits which maps transport channel data after said insertion as a physical channel of a dispersion ratio specified from the upper layer, Composition possessing a means to map transport channel data according to said number of bits on a physical channel is taken.
[0031]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.
[0032]In a means by which the data source of this invention performs coding processing for an error correction to transport channel data, and each transport channel data after said coding processing, A means to insert a DTX bit for burying the number of bits of that difference in transport channel data when the number of bits of this data is less than the maximum defined beforehand, Based on dignity of each transport channel specified from the upper layer, A means to perform rate matching which determines the number of bits which maps each transport

channel data after said insertion as a physical channel of a dispersion ratio specified from said upper layer, Composition possessing a means to multiplex each transport channel data outputted from this means, and a means to map transport channel data after multiplexing according to said number of bits on a physical channel is taken.
[0033]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.
[0034]A means to perform RETODE matching which returns transport channel data in which a data receiver of this invention was mapped in the data source of the above-mentioned composition to data in front of rate matching in said data source, A means to consider that the number of bits of the difference is a DTX bit, and to delete it when the number of bits of transport channel data after said RETODE matching is less than the maximum defined beforehand, Composition possessing a means to perform decoding processing for an error correction to transport channel data outputted from this means is taken.
[0035]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.
[0036]A means to separate transport channel data in which a data receiver of this invention was mapped in the data source of the above-mentioned composition, Based on dignity of each transport channel specified from the upper layer, each transport channel separated by this means, A means to perform RETODE matching returned to data in front of rate matching in said data source, A means to consider that the number of bits of the difference is a DTX bit, and to delete it when the number of bits of each transport channel data after said RETODE matching is less than the maximum defined beforehand, Composition possessing a means to perform decoding processing for an error correction to each transport channel data outputted from this means is taken.
[0037]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.
[0038]A base station device of this invention takes composition possessing the data source of one of the above, and the composition.
[0039]According to this composition, in a base station device, the same operation effect as one of the above and the data source of the composition can be obtained.
[0040]A mobile station of this invention takes composition possessing a data receiver of one of the above, and the composition.
[0041]According to this composition, in a mobile station, the same operation effect as one of the above and a data receiver of the composition can be obtained.
[0042]A data transmission method of this invention performs coding processing for an error correction to two or more transport channel data, When the number of bits of transport channel data after this processing is less than the maximum defined beforehand, A DTX bit for burying the number of bits of the difference is inserted in transport channel data, Rate matching which determines the number of bits which maps transport channel data after this insertion in a physical channel of a dispersion ratio specified from the upper layer is performed, and transport channel data according to said number of bits was mapped on a physical channel.

[0043]According to this method, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.
[0044]A data receiving method of this invention transport channel data mapped in the above-mentioned data transmission method, RETODE matching returned to data in front of rate matching in said data transmission method is performed, When the number of bits of transport channel data after this RETODE matching was less than the maximum defined beforehand, it considers that the number of bits of that difference is a DTX bit, it is deleted, and it was made to perform decoding processing for an error correction to transport channel data which passed through this deletion.
[0045]According to this method, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.
[0046]
[Embodiment of the Invention]Hereafter, an embodiment of the invention is described in detail with reference to drawings.
[0047](Embodiment 1) Drawing 1 is a block diagram showing the composition of the data source concerning the embodiment of the invention 1.
[0048]It gets down in fixed position and the data source shown in this drawing 1 performs channel-coding processing. However, although the following explanation shows the case where convolutional code-ized processing of the coding rates 1/3 is applied, as coding processing of an error correction, it is also the same as when convolutional code-ized processing of the coding rates 1/2 and Turbo coding processing of the coding rates 1/3 are applied.
[0049]this data source -- the [the 1st -] -- as opposed to each of nTrCH data -- the [the 1st of an identical configuration -] -- in each of the nTrCH treating part 100-1 - 100-n, Processing explained by the after-mentioned is performed by the CRC adjunct 101, the TB bond part 102, the convolutional code-ized part 103, the DTX bit inserting part 104, the rate matching part 105, the 1st interleaving part 106, and the radio frame dividing part 107.
[0050]Then, TrCH multiplexing is performed by the TrCH multiplexing part 108, and processing explained by the after-mentioned in the physical channel dividing part 109, the 2nd interleaving part 110, and the physical channel-mapping part 111 is performed as a single data row.
[0051]the [first, / the 1st -] -- operation of the nTrCH treating part 100-1 - 100-n is explained on behalf of the 1st TrCH treating part 100-1.
[0052]In the CRC adjunct 101, addition of a CRC bit to each TB in TrCH data is performed.
[0053]In the TB bond part 102, TB to which the CRC bit was added by the CRC adjunct 101 is combined to a single data row.
[0054]In the convolutional code-ized part 103, after adding an 8-bit tail bit to the data row from the TB bond part 102, convolutional code-ized processing of the coding rates 1/3 is performed.
[0055]In the DTX bit inserting part 104, when the number of bits of the TrCH data from the convolutional code-ized part 503 is less than the maximum, a part for the number of bits of the difference is inserted as a DTX bit. For this reason, the number of bits after the DTX bit inserting of TrCH data becomes always equal to the number of bits in TF from which the number of TB size xTB serves as the maximum.
[0056]In the rate matching part 105, the number of bits which maps a TrCH data row is determined as the physical channel of the dispersion ratio specified from the upper layer based on RM specified from the upper layer.

[0057]This determined number of bits is used by mapping in the physical channel-mapping part 111. A rate matching algorithm shall follow what was indicated to TS25.212.
[0058]In TrCH, since the data row of the maximum number of bits is always inputted, the variation of the number of bits before and behind rate matching will perform only rate matching processing to the case where the transmission data volume of per the 1st interleave cycle (TTI) serves as the maximum.
[0059]In the 1st interleaving part 106, block interleave over between two or more radio frames is performed to the TrCH data from the rate matching part 105.
[0060]In the radio frame dividing part 107, division into every data row transmitted by the radio frame for 10 ms each is performed.
[0061]the [thus, / the 1st -] -- every processed by the nTrCH treating part 100-1 - 100-n -- TrCH data is outputted to the TrCH multiplexing part 108.
[0062]Multiplexing processing of each TrCH data is performed in the TrCH multiplexing part 108.
[0063]In the physical channel dividing part 109, the transmission data to each code in the case of performing multi-code transfer is divided to multiplexing data.
[0064]In the 2nd interleaving part 110, block interleave within the data transmitted within 10 ms is performed to the output data from the physical channel dividing part 109.
[0065]In the physical channel-mapping part 111, the data row from the 2nd interleaving part 110 is arranged to up to a physical channel according to the above-mentioned number of bits.
[0066]here -- the -- the data flow in the convolutional code-ized part 103, the DTX bit inserting part 104, and the rate matching part 105 which process iTrCH data is shown in drawing 2, and the explanation is given.
[0067]To the convolutional code-ized processing in the convolutional code-ized part 103, the number of bits inputted at the time of TF=j which becomes settled in the size of TB, the multiplexed number of TB, etc. is made into $N_{i\ \mathrm{and}\ j}$, as shown in drawing 2 (a).
[0068]Here, $N_{i\ \mathrm{and}\ j}$ shall contain a tail bit. At this time, from the convolutional code-ized part 103, as shown in (b), the bit string of $N_{i\ \mathrm{and}\ j}$x3 is outputted.
[0069]In the DTX bit inserting part 104, as shown in (c), the DTX bit for [used as $N_{i\ \mathrm{and}\ DTX}=(N_{i,\ max}x3)-(N_{i,\ j}x3)$] the number of bits is inserted.
[0070]In the rate matching part 105, since $N_{i\ \mathrm{and}\ max}$x3 becomes an input bit number in common to all the TF, as shown in (d), only bit manipulation which becomes $(N_{i,\ max}x3)+\mathrm{delta}N_{i\ \mathrm{and}\ max}$ is performed.
[0071]Thus, in channel coding of the going-down circuit which multiplexes a transport channel in fixed position according to the data source of Embodiment 1, DTX bit inserting is performed first and it was made to perform rate matching processing after the coding processing for an error correction after that.
[0072]By this, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to the bit length of certain size. Increase of a throughput can be prevented by this.
[0073](Embodiment 2) Drawing 3 is a block diagram showing the composition of the data receiver concerning the embodiment of the invention 2.
[0074]It gets down in fixed position and the data receiver shown in this drawing 3 shows a channel decoding method. However, although the following explanation shows the case where convolutional code-ized processing of the coding rates 1/3 is applied, as coding processing of an error correction, it is also the same as when convolutional code-ized processing of the coding

rates 1/2 and Turbo coding processing of the coding rates 1/3 are applied.
[0075]In this data receiver, each physical channel data transmitted from the data source of the above-mentioned Embodiment 1 is received, processing explained by the after-mentioned by the physical channel demapping part 301, the 2nd Dinter leaving part 302, the physical channel bond part 303, and the TrCH separation part 304 is performed -- the [the 1st of an identical configuration -] -- it is outputted to the nTrCH treating part 305-1 - 305-n.
[0076]And in each TrCH treating part 305-1 - 305-n, Processing explained by the after-mentioned by the radio frame bond part 306, the 1st Dinter leaving part 307, the RETODE matching part 308, the DTX bit cutout 309, the Viterbi decoding part 310, the TB separation part 311, and the CRC judgment part 312 is performed, the [the 1st -] -- nTrCH data is outputted.
[0077]In the physical channel demapping part 301, a data row is extracted from on each physical channel.
[0078]In the 2nd Dinter leaving part 302, the block DEINTA reeve within the data transmitted within 10 ms is performed to the output data from the physical channel demapping part 301.
[0079]In the physical channel bond part 303, the transmission data by which the block DEINTA reeve was carried out is combined from each code in the case of performing multi-code transfer.
[0080]the data combined by the physical channel bond part 303 in the TrCH separation part 304 -- the [the 1st -] -- it separates into nTrCH data and outputs to the TrCH treating part 305-1 corresponding to this each - 305-n.
[0081]Next, operation of each TrCH treating part 305-1 - 305-n is explained on behalf of the 1st TrCH treating part 305-1.
[0082]In the radio frame bond part 306, combination to a part for the TTI cycle of the data row transmitted by the radio frame for 10 ms each is performed.
[0083]In the 1st Dinter leaving part 307, the block DEINTA reeve over between two or more radio frames is performed to the combination data in the radio frame bond part 306.
[0084]As opposed to the data by which the block DEINTA reeve was carried out in the RETODE matching part 308, Based on RM specified from the upper layer, operation returned to the data row in front of the rate matching of a transmitting agency is performed from the data row of TrCH mapped by TS25.212 to the physical channel of the dispersion ratio specified from the upper layer according to the rate matching algorithm of a statement.
[0085]In TrCH, since the data row of the maximum number of bits is always inputted, the variation of the number of bits before and after RETODE matching will perform only RETODE conducts matching to the case where the transmission data volume of per an interleave cycle (TTI) serves as the maximum.
[0086]In the DTX bit cutout 309, when the number of bits of the TrCH data from the RETODE matching part 308 is less than the maximum, it considers that a part for the number of bits of the difference is a DTX bit, and it is deleted.
[0087]Here, the number of bits before DTX bit deletion of TrCH data becomes always equal to the number of bits in TF from which the number of TB size xTB serves as the maximum.
[0088]In the Viterbi decoding part 310, Viterbi decoding processing (coding rates 1/3) to the data row from the DTX bit cutout 309 is performed. At this time, 8 bits of ends of a data row are treated as a tail bit.
[0089]In the TB separation part 311, the data row of TrCH decoded by the Viterbi decoding part 310 is divided into TB unit.
[0090]In the CRC judgment part 312, CRC bit decision processing to TB from the TB separation part 311 is performed. The 1st TrCH data is outputted by this.

[0091]here -- the -- the data flow in the RETODE matching part 308, the DTX bit cutout 309, and the Viterbi decoding part 310 which process the data of iTrCH is shown in drawing 4, and the explanation is given.
[0092]In the RETODE matching part 308, since $N_{i \text{ shown in drawing 4 (a)}, max}$x3+delta$N_{i, \text{and } max}$ become an input bit number in common to all the TF, only bit manipulation which is set to ($N_{i, max}$x3) is performed.
[0093]In the DTX bit cutout 309, as shown in (b), the DTX bit for [used as $N_{i \text{ and } DTX}$=($N_{i, max}$x3)-($N_{i, j}$x3)] the number of bits is deleted.
[0094]To the Viterbi decoding processing in the Viterbi decoding part 310, as shown in (c), the data row of $N_{i \text{ and } j}$x3 is inputted, and as shown in (d), the data row of $N_{i \text{ and } j}$ is obtained as an output after an error correction (a tail bit is included).
[0095]Thus, according to the data receiver of Embodiment 2, it counters with the data source of the above-mentioned Embodiment 1, DTX bit deletion is performed after RETODE conducts matching, and it was made to perform decoding processing for an error correction.
[0096]By this, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to the bit length of certain size. Increase of a throughput can be prevented by this.
[0097]In performing BTFD which used CRC of the statement for Annex A.1.2 of TS25.212 especially, Since it is not necessary to perform RETODE conducts matching for every number of transmitted bits of the TTI cycle corresponding to all the TF which TrCH of a determination object can take, the amount of receptions is reducible.
[0098]
[Effect of the Invention]As explained above, even if the number of transport blocks and transport block size which are transmitted by a transport channel change according to this invention, Rate matching processing can always be performed to the bit length of certain size, and increase of a throughput can be prevented by this.

TECHNICAL FIELD

[Field of the Invention]A mobile station of the information-and-telecommunications terminal unit etc. with which this invention was provided with the car telephone machine and the portable telephone, portable telephone function, and computer function in the mobile communications system with which the CDMA (Code Division Multiple Access) method was applied, And it is related with the data source, the data receiver and data transmission method, and data receiving method which are applied to a mobile station, the base station device which performs radio, etc.

PRIOR ART

[Description of the Prior Art]That the channel-coding method in the mobile communication system of the third generation was indicated to be to TS25.212 of 3GPP is known. Get down and about channel coding of a circuit. The art of fixed position which considers the position at the time of multiplexing two or more Transport channel (the following TrCH and notation) as immobilization, and the art of flexible position which makes a position variable are known.
[0003]The combination of the plurality TrCH received in the mobile station which gets down from a base station device and receives a line signal, In order to perform Blind Transport format detection (the following BTFD and notation) which judges the formats (the size of Transport

block, the multiplexed number of Transport block, etc.) of each TrCH without explicit information, The direction which applied fixed position can make reception easy.
[0004]Drawing 5 is a block diagram showing the composition of the conventional data source.
[0005]It gets down in fixed position and the data source shown in this drawing 5 performs channel-coding processing. However, although the following explanation shows the case where convolutional code-ized processing of the coding rates 1/3 is applied, as coding processing of an error correction, it is also the same as when convolutional code-ized processing of the coding rates 1/2 and Turbo coding processing of the coding rates 1/3 are applied.
[0006]this data source -- the [the 1st -] -- as opposed to each of nTrCH data -- the [the 1st of an identical configuration -] -- in each of the nTrCH treating part 500-1 - 500-n, Processing explained by the after-mentioned is performed by the CRC adjunct 501, the TB (Transport block) bond part 502, the convolutional code-ized part 503, the rate matching part 504, the DTX bit inserting part 505, the 1st interleaving part 506, and the radio frame dividing part 507. Then, TrCH multiplexing is performed by the TrCH multiplexing part 508, and processing explained by the after-mentioned in the physical channel dividing part 509, the 2nd interleaving part 510, and the physical channel-mapping part 511 is performed as a single data row.
[0007]the [first, / the 1st -] -- operation of the nTrCH treating part 500-1 - 500-n is explained on behalf of the 1st TrCH treating part 500-1.
[0008]In the CRC adjunct 501, addition of a CRC bit to each TB in TrCH data is performed.
[0009]In the TB bond part 502, TB to which the CRC bit was added by the CRC adjunct 501 is combined to a single data row.
[0010]In the convolutional code-ized part 503, after adding an 8-bit tail bit to the data row from the TB bond part 502, convolutional code-ized processing of the coding rates 1/3 is performed.
[0011]In the rate matching part 504, the number of bits which maps a TrCH data row is determined as the physical channel of the dispersion ratio specified from the upper layer based on RM (Rate matching attribute) specified from the upper layer.
[0012]This determined number of bits is used by mapping in the physical channel-mapping part 511. A rate matching algorithm shall follow what was indicated to TS25.212.
[0013]The variation of the number of bits before and behind rate matching, in TrCH data -- an interleave cycle -- {-- it being determined on the basis of the case where the transmission data volume of per TTI(Transmission Time Interval)} serves as the maximum, and, the [for example,] -- the number of bits from which data volume R (N^{TTI}_i) after the rate matching to transmission data volume N^{TTI}_i per TTI of iTrCH data becomes $R(N^{TTI}_i)/N^{TTI}_i=C_i$ is outputted.
[0014]In the DTX bit inserting part 505, when the number of bits after the rate matching of TrCH data is less than the maximum, a part for the number of bits of the difference is inserted as a DTX (Discontinuous Transmission) bit.
[0015]In the 1st interleaving part 506, block interleave over between two or more radio frames is performed to the TrCH data from the DTX bit inserting part 505.
[0016]In the radio frame dividing part 507, division into every data row transmitted by the radio frame for 10 ms each is performed.
[0017]the [thus, / the 1st -] -- every processed by the nTrCH treating part 500-1 - 500-n -- TrCH data is outputted to the TrCH multiplexing part 508.
[0018]Multiplexing processing of each TrCH data is performed in the TrCH multiplexing part 508.
[0019]In the physical channel dividing part 509, the transmission data to each code in the case of performing multi-code transfer is divided to multiplexing data.

[0020]In the 2nd interleaving part 510, block interleave within the data transmitted within 10 ms is performed to the output data from the physical channel dividing part 509.
[0021]In the physical channel-mapping part 511, the data row from the 2nd interleaving part 510 is arranged to up to a physical channel according to the above-mentioned number of bits.
[0022]here -- the -- the data flow in the convolutional code-ized part 503, the rate matching part 504, and the DTX bit inserting part 505 which process iTrCH data is shown in drawing 6, and the explanation is given.
[0023]To the convolutional code-ized processing in the convolutional code-ized part 503, the number of bits inputted at the time of TF(Transport Format) =j which becomes settled in the size of TB, the multiplexed number of TB, etc. is made into $N_{i \text{ and } j}$, as shown in drawing 6 (a).
[0024]Here, $N_{i \text{ and } j}$ shall contain a tail bit. At this time, from the convolutional code-ized part 503, as shown in (b), the bit string of $N_{i \text{ and } j}$x3 is outputted.
[0025]In the rate matching processing in the rate matching part 504, as shown in (c), bit manipulation which becomes x($N_{i, j}$x3) Ci=($N_{i, j}$x3) +delta$N_{i \text{ and } j}$ is performed for every TF.
[0026]In the DTX bit inserting part 505, as shown in (d), the DTX bit for [used as $N_{i, DTX}$=($N_{i, max}$x3) +delta$N_{i, max}$-($N_{i, j}$x3)+delta$N_{i, \text{ and } j}$] the number of bits is inserted.

EFFECT OF THE INVENTION

[Effect of the Invention]As explained above, even if the number of transport blocks and transport block size which are transmitted by a transport channel change according to this invention, Rate matching processing can always be performed to the bit length of certain size, and increase of a throughput can be prevented by this.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, in the conventional device, since it is necessary to the data row of the different number of bits for every TF of each TrCH to perform rate matching processing of a pattern which is different in each, there is a problem that a throughput will increase.
[0028]Since it is necessary to perform RETODE conducts matching corresponding to all the TF when getting down and performing BTFD in channel decoding in the reception of a circuit especially, a throughput will increase.
[0029]This invention is made in view of this point, and is a thing.
the purpose, even if the number of transport blocks and transport block size which are come out of and transmitted change, It is providing the data source and the data receiver which can always perform rate matching processing to the bit length of certain size, and can prevent increase of a throughput by this and a data transmission method, and a data receiving method.

MEANS

[Means for Solving the Problem]A means by which the data source of this invention performs coding processing for an error correction to two or more transport channel data, A means to insert a DTX bit for burying the number of bits of the difference in transport channel data when the number of bits of transport channel data after said coding processing is less than the maximum defined beforehand, A means to perform rate matching which determines the number

of bits which maps transport channel data after said insertion as a physical channel of a dispersion ratio specified from the upper layer, Composition possessing a means to map transport channel data according to said number of bits on a physical channel is taken.
[0031]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.
[0032]In a means by which the data source of this invention performs coding processing for an error correction to transport channel data, and each transport channel data after said coding processing, A means to insert a DTX bit for burying the number of bits of that difference in transport channel data when the number of bits of this data is less than the maximum defined beforehand, Based on dignity of each transport channel specified from the upper layer, A means to perform rate matching which determines the number of bits which maps each transport channel data after said insertion as a physical channel of a dispersion ratio specified from said upper layer, Composition possessing a means to multiplex each transport channel data outputted from this means, and a means to map transport channel data after multiplexing according to said number of bits on a physical channel is taken.
[0033]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.
[0034]A means to perform RETODE matching which returns transport channel data in which a data receiver of this invention was mapped in the data source of the above-mentioned composition to data in front of rate matching in said data source, A means to consider that the number of bits of the difference is a DTX bit, and to delete it when the number of bits of transport channel data after said RETODE matching is less than the maximum defined beforehand, Composition possessing a means to perform decoding processing for an error correction to transport channel data outputted from this means is taken.
[0035]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.
[0036]A means to separate transport channel data in which a data receiver of this invention was mapped in the data source of the above-mentioned composition, Based on dignity of each transport channel specified from the upper layer, each transport channel separated by this means, A means to perform RETODE matching returned to data in front of rate matching in said data source, A means to consider that the number of bits of the difference is a DTX bit, and to delete it when the number of bits of each transport channel data after said RETODE matching is less than the maximum defined beforehand, Composition possessing a means to perform decoding processing for an error correction to each transport channel data outputted from this means is taken.
[0037]According to this composition, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.
[0038]A base station device of this invention takes composition possessing the data source of one of the above, and the composition.
[0039]According to this composition, in a base station device, the same operation effect as one

of the above and the data source of the composition can be obtained.
[0040]A mobile station of this invention takes composition possessing a data receiver of one of the above, and the composition.
[0041]According to this composition, in a mobile station, the same operation effect as one of the above and a data receiver of the composition can be obtained.
[0042]A data transmission method of this invention performs coding processing for an error correction to two or more transport channel data, When the number of bits of transport channel data after this processing is less than the maximum defined beforehand, A DTX bit for burying the number of bits of the difference is inserted in transport channel data, Rate matching which determines the number of bits which maps transport channel data after this insertion in a physical channel of a dispersion ratio specified from the upper layer is performed, and transport channel data according to said number of bits was mapped on a physical channel.
[0043]According to this method, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.
[0044]A data receiving method of this invention transport channel data mapped in the above-mentioned data transmission method, RETODE matching returned to data in front of rate matching in said data transmission method is performed, When the number of bits of transport channel data after this RETODE matching was less than the maximum defined beforehand, it considers that the number of bits of that difference is a DTX bit, it is deleted, and it was made to perform decoding processing for an error correction to transport channel data which passed through this deletion.
[0045]According to this method, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to bit length of certain size, and increase of a throughput can be prevented by this.
[0046]
[Embodiment of the Invention]Hereafter, an embodiment of the invention is described in detail with reference to drawings.
[0047](Embodiment 1) Drawing 1 is a block diagram showing the composition of the data source concerning the embodiment of the invention 1.
[0048]It gets down in fixed position and the data source shown in this drawing 1 performs channel-coding processing. However, although the following explanation shows the case where convolutional code-ized processing of the coding rates 1/3 is applied, as coding processing of an error correction, it is also the same as when convolutional code-ized processing of the coding rates 1/2 and Turbo coding processing of the coding rates 1/3 are applied.
[0049]this data source -- the [the 1st -] -- as opposed to each of nTrCH data -- the [the 1st of an identical configuration -] -- in each of the nTrCH treating part 100-1 - 100-n, Processing explained by the after-mentioned is performed by the CRC adjunct 101, the TB bond part 102, the convolutional code-ized part 103, the DTX bit inserting part 104, the rate matching part 105, the 1st interleaving part 106, and the radio frame dividing part 107.
[0050]Then, TrCH multiplexing is performed by the TrCH multiplexing part 108, and processing explained by the after-mentioned in the physical channel dividing part 109, the 2nd interleaving part 110, and the physical channel-mapping part 111 is performed as a single data row.
[0051]the [first, / the 1st -] -- operation of the nTrCH treating part 100-1 - 100-n is explained on behalf of the 1st TrCH treating part 100-1.
[0052]In the CRC adjunct 101, addition of a CRC bit to each TB in TrCH data is performed.

[0053]In the TB bond part 102, TB to which the CRC bit was added by the CRC adjunct 101 is combined to a single data row.
[0054]In the convolutional code-ized part 103, after adding an 8-bit tail bit to the data row from the TB bond part 102, convolutional code-ized processing of the coding rates 1/3 is performed.
[0055]In the DTX bit inserting part 104, when the number of bits of the TrCH data from the convolutional code-ized part 503 is less than the maximum, a part for the number of bits of the difference is inserted as a DTX bit. For this reason, the number of bits after the DTX bit inserting of TrCH data becomes always equal to the number of bits in TF from which the number of TB size xTB serves as the maximum.
[0056]In the rate matching part 105, the number of bits which maps a TrCH data row is determined as the physical channel of the dispersion ratio specified from the upper layer based on RM specified from the upper layer.
[0057]This determined number of bits is used by mapping in the physical channel-mapping part 111. A rate matching algorithm shall follow what was indicated to TS25.212.
[0058]In TrCH, since the data row of the maximum number of bits is always inputted, the variation of the number of bits before and behind rate matching will perform only rate matching processing to the case where the transmission data volume of per the 1st interleave cycle (TTI) serves as the maximum.
[0059]In the 1st interleaving part 106, block interleave over between two or more radio frames is performed to the TrCH data from the rate matching part 105.
[0060]In the radio frame dividing part 107, division into every data row transmitted by the radio frame for 10 ms each is performed.
[0061]the [thus, / the 1st -] -- every processed by the nTrCH treating part 100-1 - 100-n -- TrCH data is outputted to the TrCH multiplexing part 108.
[0062]Multiplexing processing of each TrCH data is performed in the TrCH multiplexing part 108.
[0063]In the physical channel dividing part 109, the transmission data to each code in the case of performing multi-code transfer is divided to multiplexing data.
[0064]In the 2nd interleaving part 110, block interleave within the data transmitted within 10 ms is performed to the output data from the physical channel dividing part 109.
[0065]In the physical channel-mapping part 111, the data row from the 2nd interleaving part 110 is arranged to up to a physical channel according to the above-mentioned number of bits.
[0066]here -- the -- the data flow in the convolutional code-ized part 103, the DTX bit inserting part 104, and the rate matching part 105 which process iTrCH data is shown in drawing 2, and the explanation is given.
[0067]To the convolutional code-ized processing in the convolutional code-ized part 103, the number of bits inputted at the time of TF=j which becomes settled in the size of TB, the multiplexed number of TB, etc. is made into $N_{i\ \mathrm{and}\ j}$, as shown in drawing 2 (a).
[0068]Here, $N_{i\ \mathrm{and}\ j}$ shall contain a tail bit. At this time, from the convolutional code-ized part 103, as shown in (b), the bit string of $N_{i\ \mathrm{and}\ j}$x3 is outputted.
[0069]In the DTX bit inserting part 104, as shown in (c), the DTX bit for [used as $N_{i\ \mathrm{and}\ DTX}$=($N_{i,\ max}$x3)- ($N_{i,\ j}$x3)] the number of bits is inserted.
[0070]In the rate matching part 105, since $N_{i\ \mathrm{and}\ max}$x3 becomes an input bit number in common to all the TF, as shown in (d), only bit manipulation which becomes ($N_{i,\ max}$x3)+delta$N_{i\ \mathrm{and}\ max}$ is performed.
[0071]Thus, in channel coding of the going-down circuit which multiplexes a transport channel

in fixed position according to the data source of Embodiment 1, DTX bit inserting is performed first and it was made to perform rate matching processing after the coding processing for an error correction after that.
[0072]By this, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, rate matching processing can always be performed to the bit length of certain size. Increase of a throughput can be prevented by this.
[0073](Embodiment 2) Drawing 3 is a block diagram showing the composition of the data receiver concerning the embodiment of the invention 2.
[0074]It gets down in fixed position and the data receiver shown in this drawing 3 shows a channel decoding method. However, although the following explanation shows the case where convolutional code-ized processing of the coding rates 1/3 is applied, as coding processing of an error correction, it is also the same as when convolutional code-ized processing of the coding rates 1/2 and Turbo coding processing of the coding rates 1/3 are applied.
[0075]In this data receiver, each physical channel data transmitted from the data source of the above-mentioned Embodiment 1 is received, processing explained by the after-mentioned by the physical channel demapping part 301, the 2nd Dinter leaving part 302, the physical channel bond part 303, and the TrCH separation part 304 is performed -- the [the 1st of an identical configuration -] -- it is outputted to the nTrCH treating part 305-1 - 305-n.
[0076]And in each TrCH treating part 305-1 - 305-n, Processing explained by the after-mentioned by the radio frame bond part 306, the 1st Dinter leaving part 307, the RETODE matching part 308, the DTX bit cutout 309, the Viterbi decoding part 310, the TB separation part 311, and the CRC judgment part 312 is performed, the [the 1st -] -- nTrCH data is outputted.
[0077]In the physical channel demapping part 301, a data row is extracted from on each physical channel.
[0078]In the 2nd Dinter leaving part 302, the block DEINTA reeve within the data transmitted within 10 ms is performed to the output data from the physical channel demapping part 301.
[0079]In the physical channel bond part 303, the transmission data by which the block DEINTA reeve was carried out is combined from each code in the case of performing multi-code transfer.
[0080]the data combined by the physical channel bond part 303 in the TrCH separation part 304 -- the [the 1st -] -- it separates into nTrCH data and outputs to the TrCH treating part 305-1 corresponding to this each - 305-n.
[0081]Next, operation of each TrCH treating part 305-1 - 305-n is explained on behalf of the 1st TrCH treating part 305-1.
[0082]In the radio frame bond part 306, combination to a part for the TTI cycle of the data row transmitted by the radio frame for 10 ms each is performed.
[0083]In the 1st Dinter leaving part 307, the block DEINTA reeve over between two or more radio frames is performed to the combination data in the radio frame bond part 306.
[0084]As opposed to the data by which the block DEINTA reeve was carried out in the RETODE matching part 308, Based on RM specified from the upper layer, operation returned to the data row in front of the rate matching of a transmitting agency is performed from the data row of TrCH mapped by TS25.212 to the physical channel of the dispersion ratio specified from the upper layer according to the rate matching algorithm of a statement.
[0085]In TrCH, since the data row of the maximum number of bits is always inputted, the variation of the number of bits before and after RETODE matching will perform only RETODE conducts matching to the case where the transmission data volume of per an interleave cycle (TTI) serves as the maximum.

[0086]In the DTX bit cutout 309, when the number of bits of the TrCH data from the RETODE matching part 308 is less than the maximum, it considers that a part for the number of bits of the difference is a DTX bit, and it is deleted.
[0087]Here, the number of bits before DTX bit deletion of TrCH data becomes always equal to the number of bits in TF from which the number of TB size xTB serves as the maximum.
[0088]In the Viterbi decoding part 310, Viterbi decoding processing (coding rates 1/3) to the data row from the DTX bit cutout 309 is performed. At this time, 8 bits of ends of a data row are treated as a tail bit.
[0089]In the TB separation part 311, the data row of TrCH decoded by the Viterbi decoding part 310 is divided into TB unit.
[0090]In the CRC judgment part 312, CRC bit decision processing to TB from the TB separation part 311 is performed. The 1st TrCH data is outputted by this.
[0091]here -- the -- the data flow in the RETODE matching part 308, the DTX bit cutout 309, and the Viterbi decoding part 310 which process the data of iTrCH is shown in drawing 4, and the explanation is given.
[0092]In the RETODE matching part 308, since $N_{i\ \text{shown in drawing 4 (a)},\ max}$x3+delta$N_{i,\ \text{and}\ max}$ become an input bit number in common to all the TF, only bit manipulation which is set to ($N_{i,\ max}$x3) is performed.
[0093]In the DTX bit cutout 309, as shown in (b), the DTX bit for [used as $N_{i\ \text{and}\ DTX}$=($N_{i,\ max}$x3)-($N_{i,\ j}$x3)] the number of bits is deleted.
[0094]To the Viterbi decoding processing in the Viterbi decoding part 310, as shown in (c), the data row of $N_{i\ \text{and}\ j}$x3 is inputted, and as shown in (d), the data row of $N_{i\ \text{and}\ j}$ is obtained as an output after an error correction (a tail bit is included).
[0095]Thus, according to the data receiver of Embodiment 2, it counters with the data source of the above-mentioned Embodiment 1, DTX bit deletion is performed after RETODE conducts matching, and it was made to perform decoding processing for an error correction.
[0096]By this, even if the number of transport blocks and transport block size which are transmitted by a transport channel change, RETODE conducts matching can always be performed to the bit length of certain size. Increase of a throughput can be prevented by this.
[0097]In performing BTFD which used CRC of the statement for Annex A.1.2 of TS25.212 especially, Since it is not necessary to perform RETODE conducts matching for every number of transmitted bits of the TTI cycle corresponding to all the TF which TrCH of a determination object can take, the amount of receptions is reducible.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]The block diagram showing the composition of the data source concerning the embodiment of the invention 1
[Drawing 2]The data flow diagram for explaining operation of the data transmission processing by the data source concerning Embodiment 1
[Drawing 3]The block diagram showing the composition of the data receiver concerning the embodiment of the invention 2
[Drawing 4]The data flow diagram for explaining operation of the data receiving processing by the data receiver concerning Embodiment 2
[Drawing 5]The block diagram showing the composition of the conventional data source

[Drawing 6]The data flow diagram for explaining operation of the data transmission processing by the conventional data source
[Description of Notations]
100-1 - 100-n -- the [the 1st -] -- a nTrCH treating part
101 CRC adjunct
102 TB bond part
103 Convolutional code-ized part
104 DTX bit inserting part
105 Rate matching part
106 The 1st interleaving part
107 Radio frame dividing part
108 TrCH multiplexing part
109 Physical channel dividing part
110 The 2nd interleaving part
111 Physical channel-mapping part
301 Physical channel demapping part
302 The 2nd Dinter leaving part
303 Physical channel bond part
304 TrCH separation part
305-1 - 305-n -- the [the 1st -] -- a nTrCH treating part
306 Radio frame bond part
307 The 1st Dinter leaving part
308 RETODE matching part
309 DTX bit cutout
310 Viterbi decoding part
311 TB separation part
312 CRC judgment part

[Translation done.]

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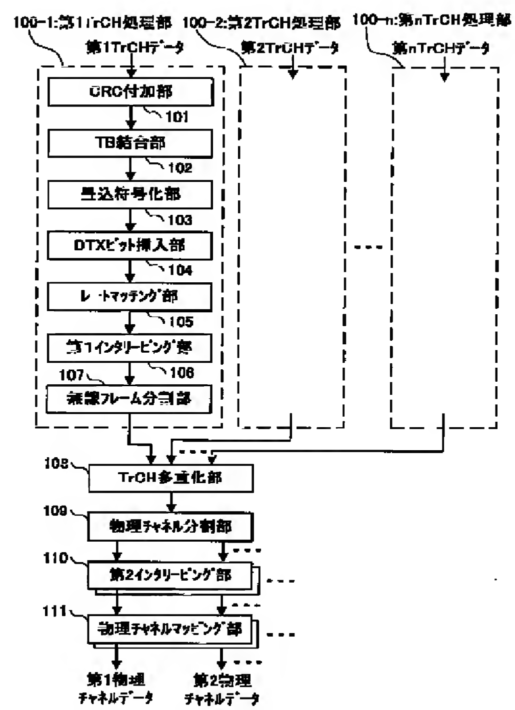
(54)【発明の名称】　データ送信装置とデータ受信装置及びデータ送信方法とデータ受信方法

(57)【要約】
【課題】　トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができ、これによって処理量の増大を防止すること。
【解決手段】　ＣＲＣ付加部１０１から畳込符号化部１０３において、トランスポートチャネルデータ（ＴｒＣＨデータ）に誤り訂正のための符号化処理を行う。ＤＴＸビット挿入部１０４で、符号化処理後のＴｒＣＨデータのビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのＤＴＸビットをＴｒＣＨデータに挿入する。レートマッチング部１０５で、上位レイヤ指定の拡散率の物理チャネルに、上記挿入後のＴｒＣＨデータをマッピングするビット数を決定する。物理チャネルマッピング部１１１で、上記ビット数に応じたＴｒＣＨデータを物理チャネル上にマッピングする。



【特許請求の範囲】

【請求項１】　複数のトランスポートチャネルデータに、誤り訂正のための符号化処理を行う手段と、前記符号化処理後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのＤＴＸビットをトランスポートチャネルデータに挿入する手段と、上位レイヤから指定された拡散率の物理チャネルに、前記挿入後のトランスポートチャネルデータをマッピングするビット数を決定するレートマッチングを行う手段と、前記ビット数に応じたトランスポートチャネルデータを物理チャネル上にマッピングする手段と、を具備することを特徴とするデータ送信装置。

【請求項２】　トランスポートチャネルデータに、誤り訂正のための符号化処理を行う手段と、前記符号化処理後の各々のトランスポートチャネルデータにおいて、このデータのビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのＤＴＸビットをトランスポートチャネルデータに挿入する手段と、上位レイヤから指定された各々のトランスポートチャネルの重みに基づき、前記上位レイヤから指定された拡散率の物理チャネルに、前記挿入後の各々のトランスポートチャネルデータをマッピングするビット数を決定するレートマッチングを行う手段と、この手段から出力される各々のトランスポートチャネルデータを多重化する手段と、前記ビット数に応じた多重化後のトランスポートチャネルデータを物理チャネル上にマッピングする手段と、を具備することを特徴とするデータ送信装置。

【請求項３】　請求項１記載のデータ送信装置においてマッピングされたトランスポートチャネルデータを、前記データ送信装置におけるレートマッチング前のデータに戻すレートデマッチングを行う手段と、前記レートデマッチング後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合、その差分のビット数をＤＴＸビットと見なして削除する手段と、この手段から出力されるトランスポートチャネルデータに、誤り訂正のための復号処理を行う手段と、を具備することを特徴とするデータ受信装置。

【請求項４】　請求項２記載のデータ送信装置においてマッピングされたトランスポートチャネルデータを分離する手段と、この手段で分離された各々のトランスポートチャネルを、上位レイヤから指定された各々のトランスポートチャネルの重みに基づき、前記データ送信装置におけるレートマッチング前のデータに戻すレートデマッチングを行う手段と、前記レートデマッチング後の各々のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合、その差分のビット数をＤＴＸビットと見なして削除する手段と、この手段から出力される各々のトランスポートチャネルデータに、誤り訂正のための復号処理を行う手段と、を具備することを特徴とするデータ受信装置。

【請求項５】　請求項１又は請求項２記載のデータ送信装置を具備することを特徴とする基地局装置。

【請求項６】　請求項３又は請求項４記載のデータ受信装置を具備することを特徴とする移動局装置。

【請求項７】　複数のトランスポートチャネルデータに誤り訂正のための符号化処理を行い、この処理後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのＤＴＸビットをトランスポートチャネルデータに挿入し、この挿入後のトランスポートチャネルデータを上位レイヤから指定された拡散率の物理チャネルにマッピングするビット数を決定するレートマッチングを行い、前記ビット数に応じたトランスポートチャネルデータを物理チャネル上にマッピングすることを特徴とするデータ送信方法。

【請求項８】　請求項７記載のデータ送信方法においてマッピングされたトランスポートチャネルデータを、前記データ送信方法におけるレートマッチング前のデータに戻すレートデマッチングを行い、このレートデマッチング後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合、その差分のビット数をＤＴＸビットと見なして削除し、この削除処理を経たトランスポートチャネルデータに、誤り訂正のための復号処理を行うことを特徴とするデータ受信方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、ＣＤＭＡ（Code Division Multiple Access）方式が適用された移動体通信システムにおける自動車電話機・携帯電話機や携帯電話機能及びコンピュータ機能を備えた情報通信端末装置等の移動局装置、及び移動局装置と無線通信を行う基地局装置等に適用されるデータ送信装置とデータ受信装置及びデータ送信方法とデータ受信方法に関する。

【０００２】

【従来の技術】第３世代の移動通信システムにおけるチャネルコーディング方法は、３ＧＰＰのＴＳ２５．２１２に記載されたものが知られている。下り回線のチャネルコーディングについては、複数のTransport channel（以下ＴｒＣＨと表記）を多重化する際の位置を固定とするfixed positionという技術と、位置を可変とするflexible positionという技術とが知られている。

【０００３】基地局装置からの下り回線信号を受信する移動局装置において、受信した複数ＴｒＣＨの組み合わせと、各ＴｒＣＨのフォーマット（Transport blockのサイズやTransport blockの多重数など）を明示的な情報なしに判定するBlind Transport format detection（以下ＢＴＦＤと表記）を行うには、fixed positionを適用した方が受信処理を容易にすることができる。

【０００４】図5は、従来のデータ送信装置の構成を示

すブロック図である。

【0005】この図5に示すデータ送信装置は、fixed positionの場合の下りチャネルコーディング処理を行うものである。但し、以下の説明では、誤り訂正の符号化処理として、符号化率1／3の畳み込み符号化処理が適用された場合を示すが、符号化率1／2の畳み込み符号化処理や、符号化率1／3のTurbo符号化処理が適用された場合も同様である。

【0006】このデータ送信装置では、第1〜第nＴｒＣＨデータの各々に対して、同一構成の第1〜第nＴｒＣＨ処理部５００−１〜５００−ｎの各々において、ＣＲＣ付加部５０１、ＴＢ(Transport block)結合部５０２、畳込符号化部５０３、レートマッチング部５０４、ＤＴＸビット挿入部５０５、第1インタリービング部５０６及び無線フレーム分割部５０７で、後述で説明する処理を行う。この後、ＴｒＣＨ多重化部５０８でＴｒＣＨ多重化を行い、単一のデータ列として、物理チャネル分割部５０９、第2インタリービング部５１０及び物理チャネルマッピング部５１１で、後述で説明する処理を行う。

【0007】まず、第1〜第nＴｒＣＨ処理部５００−１〜５００−ｎの動作を、第1ＴｒＣＨ処理部５００−１を代表して説明する。

【0008】ＣＲＣ付加部５０１では、ＴｒＣＨデータにおける各ＴＢに対するＣＲＣビットの付加が行われる。

【0009】ＴＢ結合部５０２では、ＣＲＣ付加部５０１でＣＲＣビットが付加されたＴＢを、単一のデータ列へと結合する。

【0010】畳込符号化部５０３では、ＴＢ結合部５０２からのデータ列に８ビットのtailビットを付加した後、符号化率1／3の畳み込み符号化処理を行う。

【0011】レートマッチング部５０４では、上位レイヤから指定されたＲＭ(Rate matching attribute)に基づき、上位レイヤから指定された拡散率の物理チャネルに、ＴｒＣＨデータ列をマッピングするビット数を決定する。

【0012】この決定されたビット数は、物理チャネルマッピング部５１１でのマッピングで用いられる。レートマッチングアルゴリズムは、ＴＳ２５．２１２に記載されたものに従うものとする。

【0013】レートマッチングの前後におけるビット数の変化量は、ＴｒＣＨデータにおいて、インタリーブ周期｛ＴＴＩ(Transmission Time Interval)｝当たりの伝送データ量が最大となる場合を基準にして決定され、例えば、第ｉＴｒＣＨデータのＴＴＩ当たりの伝送データ量N^{TTI}_iに対するレートマッチング後のデータ量Ｒ（N^{TTI}_i）は、Ｒ（N^{TTI}_i）／$N^{TTI}_i = C_i$となるようなビット数が出力される。

【0014】ＤＴＸビット挿入部５０５では、ＴｒＣＨデータのレートマッチング後のビット数が、最大値に満たなかった場合に、その差分のビット数分をＤＴＸ（Discontinuous Transmission）ビットとして挿入する。

【0015】第1インタリービング部５０６では、ＤＴＸビット挿入部５０５からのＴｒＣＨデータに対して、複数無線フレーム間にわたるブロックインタリーブを行う。

【0016】無線フレーム分割部５０７では、各１０ｍｓの無線フレームで伝送するデータ列毎への分割を行う。

【0017】このように第1〜第nＴｒＣＨ処理部５００−１〜５００−ｎで処理された各ＴｒＣＨデータが、ＴｒＣＨ多重化部５０８へ出力される。

【0018】ＴｒＣＨ多重化部５０８では、各ＴｒＣＨデータの多重化処理を行う。

【0019】物理チャネル分割部５０９では、多重化データに対して、マルチコード伝送を行う場合の各コードへの伝送データの分割を行う。

【0020】第2インタリービング部５１０では、物理チャネル分割部５０９からの出力データに対して、１０ｍｓ内で伝送するデータ内でのブロックインタリーブを行う。

【0021】物理チャネルマッピング部５１１では、第2インタリービング部５１０からのデータ列を、上記ビット数に応じて物理チャネル上へ配置する。

【0022】ここで、第ｉＴｒＣＨデータを処理する畳込符号化部５０３、レートマッチング部５０４及びＤＴＸビット挿入部５０５におけるデータフローを図6に示し、その説明を行う。

【0023】畳込符号化部５０３における畳み込み符号化処理に対して、ＴＢのサイズ、ＴＢの多重数などで定まるＴＦ(Transport Format)＝ｊのときに入力されるビット数を、図6（ａ）に示すように、$N_{i,j}$とする。

【0024】ここで、$N_{i,j}$は、tailビットを含むものとする。このとき、畳込符号化部５０３からは、（ｂ）に示すように、$N_{i,j}\times3$のビット列が出力される。

【0025】レートマッチング部５０４におけるレートマッチング処理では、（ｃ）に示すように、$(N_{i,j}\times3)\times Ci=(N_{i,j}\times3)+\Delta N_{i,j}$となるようなビット操作がＴＦ毎に行われる。

【0026】ＤＴＸビット挿入部５０５では、（ｄ）に示すように、$N_{i,DTX}=(N_{i,max}\times3)+\Delta N_{i,max}-(N_{i,j}\times3)+\Delta N_{i,j}$となるビット数分のＤＴＸビットが挿入される。

【0027】

【発明が解決しようとする課題】しかしながら、従来の装置においては、各ＴｒＣＨのＴＦ毎に異なるビット数のデータ列に対して、それぞれに異なるパターンのレートマッチング処理を行う必要があるので、処理量が増大してしまうという問題がある。

【００２８】特に、下り回線の受信処理におけるチャネルデコーディングにおいてＢＴＦＤを実行する場合に、全ＴＦに対応するレートデマッチング処理を行う必要があるため、処理量が増大してしまう。

【００２９】本発明はかかる点に鑑みてなされたものであり、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができ、これによって処理量の増大を防止することができるデータ送信装置とデータ受信装置及びデータ送信方法とデータ受信方法を提供することを目的とする。

【００３０】

【課題を解決するための手段】本発明のデータ送信装置は、複数のトランスポートチャネルデータに、誤り訂正のための符号化処理を行う手段と、前記符号化処理後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのＤＴＸビットをトランスポートチャネルデータに挿入する手段と、上位レイヤから指定された拡散率の物理チャネルに、前記挿入後のトランスポートチャネルデータをマッピングするビット数を決定するレートマッチングを行う手段と、前記ビット数に応じたトランスポートチャネルデータを物理チャネル上にマッピングする手段と、を具備する構成を採る。

【００３１】この構成によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【００３２】本発明のデータ送信装置は、トランスポートチャネルデータに、誤り訂正のための符号化処理を行う手段と、前記符号化処理後の各々のトランスポートチャネルデータにおいて、このデータのビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのＤＴＸビットをトランスポートチャネルデータに挿入する手段と、上位レイヤから指定された各々のトランスポートチャネルの重みに基づき、前記上位レイヤから指定された拡散率の物理チャネルに、前記挿入後の各々のトランスポートチャネルデータをマッピングするビット数を決定するレートマッチングを行う手段と、この手段から出力される各々のトランスポートチャネルデータを多重化する手段と、前記ビット数に応じた多重化後のトランスポートチャネルデータを物理チャネル上にマッピングする手段と、を具備する構成を採る。

【００３３】この構成によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【００３４】本発明のデータ受信装置は、上記構成のデータ送信装置においてマッピングされたトランスポートチャネルデータを、前記データ送信装置におけるレートマッチング前のデータに戻すレートデマッチングを行う手段と、前記レートデマッチング後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合、その差分のビット数をＤＴＸビットと見なして削除する手段と、この手段から出力されるトランスポートチャネルデータに、誤り訂正のための復号処理を行う手段と、を具備する構成を採る。

【００３５】この構成によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートデマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【００３６】本発明のデータ受信装置は、上記構成のデータ送信装置においてマッピングされたトランスポートチャネルデータを分離する手段と、この手段で分離された各々のトランスポートチャネルを、上位レイヤから指定された各々のトランスポートチャネルの重みに基づき、前記データ送信装置におけるレートマッチング前のデータに戻すレートデマッチングを行う手段と、前記レートデマッチング後の各々のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合、その差分のビット数をＤＴＸビットと見なして削除する手段と、この手段から出力される各々のトランスポートチャネルデータに、誤り訂正のための復号処理を行う手段と、を具備する構成を採る。

【００３７】この構成によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートデマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【００３８】本発明の基地局装置は、上記いずれかと同構成のデータ送信装置を具備する構成を採る。

【００３９】この構成によれば、基地局装置において、上記いずれかと同構成のデータ送信装置と同様の作用効果を得ることができる。

【００４０】本発明の移動局装置は、上記いずれかと同構成のデータ受信装置を具備する構成を採る。

【００４１】この構成によれば、移動局装置において、上記いずれかと同構成のデータ受信装置と同様の作用効果を得ることができる。

【００４２】本発明のデータ送信方法は、複数のトランスポートチャネルデータに誤り訂正のための符号化処理を行い、この処理後のトランスポートチャネルデータの

ビット数が予め定められた最大値に満たない場合に、その差分のビット数を埋めるためのＤＴＸビットをトランスポートチャネルデータに挿入し、この挿入後のトランスポートチャネルデータを上位レイヤから指定された拡散率の物理チャネルにマッピングするビット数を決定するレートマッチングを行い、前記ビット数に応じたトランスポートチャネルデータを物理チャネル上にマッピングするようにした。

【００４３】この方法によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【００４４】本発明のデータ受信方法は、上記のデータ送信方法においてマッピングされたトランスポートチャネルデータを、前記データ送信方法におけるレートマッチング前のデータに戻すレートデマッチングを行い、このレートデマッチング後のトランスポートチャネルデータのビット数が予め定められた最大値に満たない場合、その差分のビット数をＤＴＸビットと見なして削除し、この削除処理を経たトランスポートチャネルデータに、誤り訂正のための復号処理を行うようにした。

【００４５】この方法によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートデマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【００４６】

【発明の実施の形態】以下、本発明の実施の形態について、図面を参照して詳細に説明する。

【００４７】（実施の形態１）図１は、本発明の実施の形態１に係るデータ送信装置の構成を示すブロック図である。

【００４８】この図１に示すデータ送信装置は、fixed positionの場合の下りチャネルコーディング処理を行うものである。但し、以下の説明では、誤り訂正の符号化処理として、符号化率１／３の畳み込み符号化処理が適用された場合を示すが、符号化率１／２の畳み込み符号化処理や、符号化率１／３のTurbo符号化処理が適用された場合も同様である。

【００４９】このデータ送信装置では、第１～第ｎＴｒＣＨデータの各々に対して、同一構成の第１～第ｎＴｒＣＨ処理部１００－１～１００－ｎの各々において、ＣＲＣ付加部１０１、ＴＢ結合部１０２、畳込符号化部１０３、ＤＴＸビット挿入部１０４、レートマッチング部１０５、第１インタリービング部１０６及び無線フレーム分割部１０７で、後述で説明する処理を行う。

【００５０】この後、ＴｒＣＨ多重化部１０８でＴｒＣＨ多重化を行い、単一のデータ列として、物理チャネル分割部１０９、第２インタリービング部１１０及び物理チャネルマッピング部１１１で、後述で説明する処理を行う。

【００５１】まず、第１～第ｎＴｒＣＨ処理部１００－１～１００－ｎの動作を、第１ＴｒＣＨ処理部１００－１を代表して説明する。

【００５２】ＣＲＣ付加部１０１では、ＴｒＣＨデータにおける各ＴＢに対するＣＲＣビットの付加が行われる。

【００５３】ＴＢ結合部１０２では、ＣＲＣ付加部１０１でＣＲＣビットが付加されたＴＢを、単一のデータ列へと結合する。

【００５４】畳込符号化部１０３では、ＴＢ結合部１０２からのデータ列に８ビットのtailビットを付加した後、符号化率１／３の畳み込み符号化処理を行う。

【００５５】ＤＴＸビット挿入部１０４では、畳込符号化部５０３からのＴｒＣＨデータのビット数が、最大値に満たなかった場合に、その差分のビット数分をＤＴＸビットとして挿入する。このため、ＴｒＣＨデータのＤＴＸビット挿入後のビット数は、ＴＢサイズ×ＴＢ数が最大となるＴＦにおけるビット数と常に等しくなる。

【００５６】レートマッチング部１０５では、上位レイヤから指定されたＲＭに基づき、上位レイヤから指定された拡散率の物理チャネルに、ＴｒＣＨデータ列をマッピングするビット数を決定する。

【００５７】この決定されたビット数は、物理チャネルマッピング部１１１でのマッピングで用いられる。レートマッチングアルゴリズムはＴＳ２５．２１２に記載されたものに従うものとする。

【００５８】レートマッチングの前後におけるビット数の変化量は、ＴｒＣＨにおいて、常に最大ビット数相当のデータ列が入力されるので、第１インタリーブ周期（ＴＴＩ）当たりの伝送データ量が最大となる場合に対するレートマッチング処理のみを行うことになる。

【００５９】第１インタリービング部１０６では、レートマッチング部１０５からのＴｒＣＨデータに対して、複数無線フレーム間にわたるブロックインタリーブを行う。

【００６０】無線フレーム分割部１０７では、各１０ｍｓの無線フレームで伝送するデータ列毎への分割を行う。

【００６１】このように第１～第ｎＴｒＣＨ処理部１００－１～１００－ｎで処理された各ＴｒＣＨデータが、ＴｒＣＨ多重化部１０８へ出力される。

【００６２】ＴｒＣＨ多重化部１０８では、各ＴｒＣＨデータの多重化処理を行う。

【００６３】物理チャネル分割部１０９では、多重化データに対して、マルチコード伝送を行う場合の各コードへの伝送データの分割を行う。

【００６４】第２インタリービング部１１０では、物理チャネル分割部１０９からの出力データに対して、１０ｍｓ内で伝送するデータ内でのブロックインタリーブを行う。

【００６５】物理チャネルマッピング部１１１では、第２インタリービング部１１０からのデータ列を、上記ビット数に応じて物理チャネル上へ配置する。

【００６６】ここで、第ｉＴｒＣＨデータを処理する畳込符号化部１０３、ＤＴＸビット挿入部１０４及びレートマッチング部１０５におけるデータフローを図２に示し、その説明を行う。

【００６７】畳込符号化部１０３における畳み込み符号化処理に対して、ＴＢのサイズ、ＴＢの多重数などで定まるＴＦ＝ｊのときに入力されるビット数を、図２（ａ）に示すように、$N_{i,j}$とする。

【００６８】ここで、$N_{i,j}$は、tailビットを含むものとする。このとき、畳込符号化部１０３からは、（ｂ）に示すように、$N_{i,j}$×３のビット列が出力される。

【００６９】ＤＴＸビット挿入部１０４では、（ｃ）に示すように、$N_{i,DTX}$＝（$N_{i,max}$×３）－（$N_{i,j}$×３）となるビット数分のＤＴＸビットが挿入される。

【００７０】レートマッチング部１０５では、全ＴＦに対して共通に$N_{i,max}$×３が入力ビット数となるので、（ｄ）に示すように、（$N_{i,max}$×３）＋Δ$N_{i,max}$となるようなビット操作のみ行われる。

【００７１】このように、実施の形態１のデータ送信装置によれば、トランスポートチャネルの多重化を、fixed positionにて行う下り回線のチャネルコーディングにおいて、誤り訂正のための符号化処理後に、まずＤＴＸビット挿入処理を行い、その後にレートマッチング処理を行うようにした。

【００７２】これによって、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができる。これによって処理量の増大を防止することができる。

【００７３】（実施の形態２）図３は、本発明の実施の形態２に係るデータ受信装置の構成を示すブロック図である。

【００７４】この図３に示すデータ受信装置は、fixed positionの場合の下りチャネルデコーディング方法を示す。但し、以下の説明では、誤り訂正の符号化処理として、符号化率１／３の畳み込み符号化処理が適用された場合を示すが、符号化率１／２の畳み込み符号化処理や、符号化率１／３のTurbo符号化処理が適用された場合も同様である。

【００７５】このデータ受信装置では、上記実施の形態１のデータ送信装置から送信された各物理チャネルデータが受信され、物理チャネルデマッピング部３０１、第２デインタリービング部３０２、物理チャネル結合部３０３及びＴｒＣＨ分離部３０４で後述で説明する処理が行われ、同一構成の第１～第ｎＴｒＣＨ処理部３０５－１～３０５－ｎへ出力される。

【００７６】そして、各々のＴｒＣＨ処理部３０５－１～３０５－ｎにおいて、無線フレーム結合部３０６、第１デインタリービング部３０７、レートデマッチング部３０８、ＤＴＸビット削除部３０９、ビタビ復号部３１０、ＴＢ分離部３１１及びＣＲＣ判定部３１２で後述で説明する処理が行われ、第１～第ｎＴｒＣＨデータが出力されるようになっている。

【００７７】物理チャネルデマッピング部３０１では、各物理チャネル上からデータ列を抽出する。

【００７８】第２デインタリービング部３０２では、物理チャネルデマッピング部３０１からの出力データに対して、１０ｍｓ内で伝送するデータ内でのブロックデインタリーブを行う。

【００７９】物理チャネル結合部３０３では、マルチコード伝送を行う場合の各コードから、ブロックデインタリーブされた伝送データの結合を行う。

【００８０】ＴｒＣＨ分離部３０４では、物理チャネル結合部３０３で結合されたデータを、第１～第ｎＴｒＣＨデータに分離し、この各々に対応するＴｒＣＨ処理部３０５－１～３０５－ｎへ出力する。

【００８１】次に、各ＴｒＣＨ処理部３０５－１～３０５－ｎの動作を、第１ＴｒＣＨ処理部３０５－１を代表して説明する。

【００８２】無線フレーム結合部３０６では、各１０ｍｓの無線フレームで伝送されたデータ列のＴＴＩ周期分への結合を行う。

【００８３】第１デインタリービング部３０７では、無線フレーム結合部３０６での結合データに対して、複数無線フレーム間にわたるブロックデインタリーブを行う。

【００８４】レートデマッチング部３０８では、ブロックデインタリーブされたデータに対して、上位レイヤから指定されたＲＭに基づき、上位レイヤから指定された拡散率の物理チャネルへ、ＴＳ２５．２１２に記載のレートマッチングアルゴリズムに従ってマッピングされたＴｒＣＨのデータ列から、送信元のレートマッチング前のデータ列に戻す操作を行う。

【００８５】レートデマッチングの前後におけるビット数の変化量は、ＴｒＣＨにおいて、常に最大ビット数相当のデータ列が入力されるので、インタリーブ周期（ＴＴＩ）当たりの伝送データ量が最大となる場合に対するレートデマッチング処理のみを行うことになる。

【００８６】ＤＴＸビット削除部３０９では、レートデマッチング部３０８からのＴｒＣＨデータのビット数が、最大値に満たなかった場合に、その差分のビット数分をＤＴＸビットとみなして削除する。

【００８７】ここで、ＴｒＣＨデータのＤＴＸビット削

除前のビット数は、ＴＢサイズ×ＴＢ数が最大となるＴＦにおけるビット数と常に等しくなる。

【００８８】ビタビ復号部３１０では、ＤＴＸビット削除部３０９からのデータ列に対するビタビ復号処理（符号化率１／３）を行う。このとき、データ列の末尾８ビットはtailビットとして扱う。

【００８９】ＴＢ分離部３１１では、ビタビ復号部３１０で復号されたＴｒＣＨのデータ列をＴＢ単位へと分離する。

【００９０】ＣＲＣ判定部３１２では、ＴＢ分離部３１１からのＴＢに対するＣＲＣビット判定処理を行う。これによって、第１ＴｒＣＨデータが出力される。

【００９１】ここで、第ｉＴｒＣＨのデータを処理するレートデマッチング部３０８、ＤＴＸビット削除部３０９及びビタビ復号部３１０におけるデータフローを図４に示し、その説明を行う。

【００９２】レートデマッチング部３０８では、全ＴＦに対して共通に、図４（ａ）に示す$N_{i,max}$×３＋$\Delta N_{i,max}$が入力ビット数となるので、（$N_{i,max}$×３）となるようなビット操作のみ行われる。

【００９３】ＤＴＸビット削除部３０９では、（ｂ）に示すように、$N_{i,DTX}$＝（$N_{i,max}$×３）－（$N_{i,j}$×３）となるビット数分のＤＴＸビットが削除される。

【００９４】ビタビ復号部３１０でのビタビ復号処理に対して、（ｃ）に示すように、$N_{i,j}$×３のデータ列が入力され、誤り訂正後の出力として、（ｄ）に示すように、$N_{i,j}$のデータ列が得られる（tailビットを含む）。

【００９５】このように、実施の形態２のデータ受信装置によれば、上記実施の形態１のデータ送信装置と対向して、レートデマッチング処理後にＤＴＸビット削除処理を行い、誤り訂正のための復号処理を行うようにした。

【００９６】これによって、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートデマッチング処理を行うことができる。これによって処理量の増大を防止することができる。

【００９７】特に、ＴＳ２５．２１２のAnnex Ａ．１．２に記載のＣＲＣを利用したＢＴＦＤを実行する場合には、判定対象のＴｒＣＨが取り得る全てのＴＦに対応したＴＴＩ周期の伝送ビット数毎にレートデマッチング処理を行う必要がないため、受信処理量を削減することができる。

【００９８】

【発明の効果】以上説明したように、本発明によれば、トランスポートチャネルで伝送されるトランスポートブロック数やトランスポートブロックサイズが変化しても、常時一定サイズのビット長に対してレートマッチング処理を行うことができ、これによって処理量の増大を防止することができる。

【図面の簡単な説明】

【図１】本発明の実施の形態１に係るデータ送信装置の構成を示すブロック図

【図２】実施の形態１に係るデータ送信装置によるデータ送信処理の動作を説明するためのデータフロー図

【図３】本発明の実施の形態２に係るデータ受信装置の構成を示すブロック図

【図４】実施の形態２に係るデータ受信装置によるデータ受信処理の動作を説明するためのデータフロー図

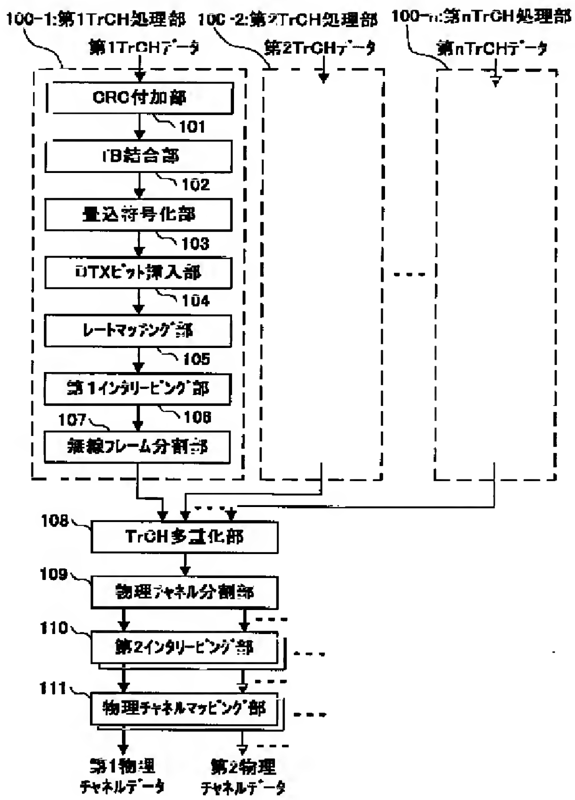
【図５】従来のデータ送信装置の構成を示すブロック図

【図６】従来のデータ送信装置によるデータ送信処理の動作を説明するためのデータフロー図

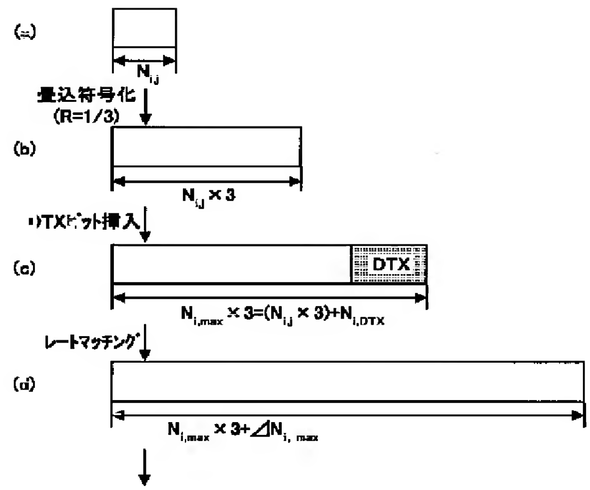
【符号の説明】

１００－１～１００－ｎ　第１～第ｎＴｒＣＨ処理部
１０１　ＣＲＣ付加部
１０２　ＴＢ結合部
１０３　畳込符号化部
１０４　ＤＴＸビット挿入部
１０５　レートマッチング部
１０６　第１インタリービング部
１０７　無線フレーム分割部
１０８　ＴｒＣＨ多重化部
１０９　物理チャネル分割部
１１０　第２インタリービング部
１１１　物理チャネルマッピング部
３０１　物理チャネルデマッピング部
３０２　第２デインタリービング部
３０３　物理チャネル結合部
３０４　ＴｒＣＨ分離部
３０５－１～３０５－ｎ　第１～第ｎＴｒＣＨ処理部
３０６　無線フレーム結合部
３０７　第１デインタリービング部
３０８　レートデマッチング部
３０９　ＤＴＸビット削除部
３１０　ビタビ復号部
３１１　ＴＢ分離部
３１２　ＣＲＣ判定部

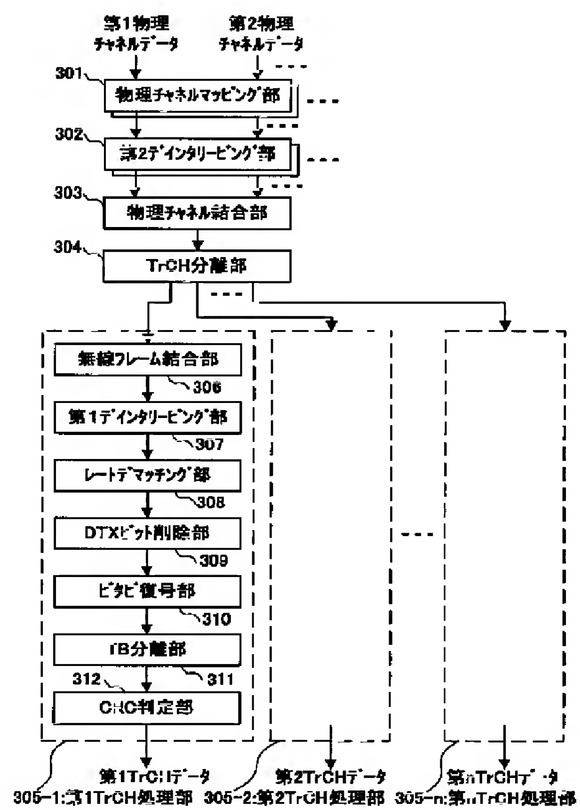
【図1】


100-1:第1TrCH処理部
100-2:第2TrCH処理部
100-n:第nTrCH処理部
第1TrCHデータ
第2TrCHデータ
第nTrCHデータ
CRC付加部
101
TB結合部
102
畳込符号化部
103
DTXビット挿入部
104
レートマッチング部
105
第1インタリービング部
106
107
無線フレーム分割部
108
TrCH多重化部
109
物理チャネル分割部
110
第2インタリービング部
111
物理チャネルマッピング部
第1物理チャネルデータ
第2物理チャネルデータ

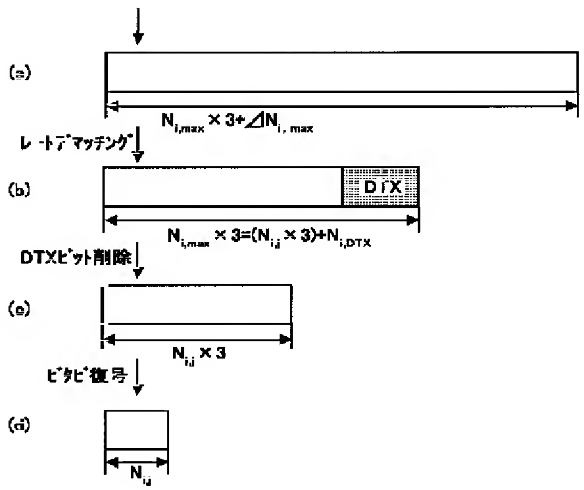
【図2】


(a)
$N_{i,j}$
畳込符号化
(R=1/3)
(b)
$N_{i,j}\times 3$
DTXビット挿入
(c)
DTX
$N_{i,max}\times 3=(N_{i,j}\times 3)+N_{i,DTX}$
レートマッチング
(d)
$N_{i,max}\times 3+\Delta N_{i,max}$

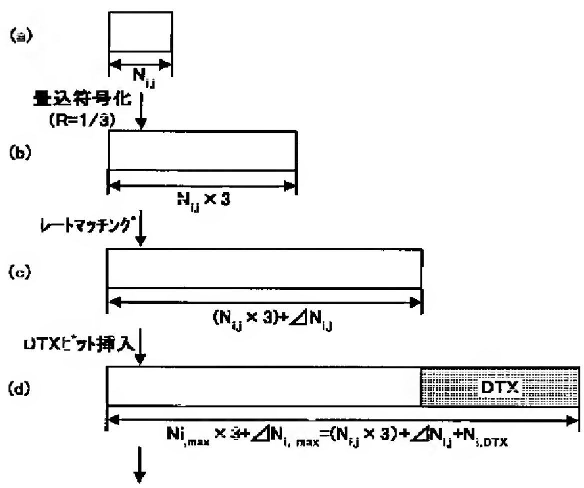
【図3】


第1物理チャネルデータ
第2物理チャネルデータ
301
物理チャネルマッピング部
302
第2デインタリービング部
303
物理チャネル結合部
304
TrCH分離部
無線フレーム結合部
306
第1デインタリービング部
307
レートデマッチング部
308
DTXビット削除部
309
ビタビ復号部
310
TB分離部
311
312
CRC判定部
第1TrCHデータ
第2TrCHデータ
第nTrCHデータ
305-1:第1TrCH処理部
305-2:第2TrCH処理部
305-n:第nTrCH処理部

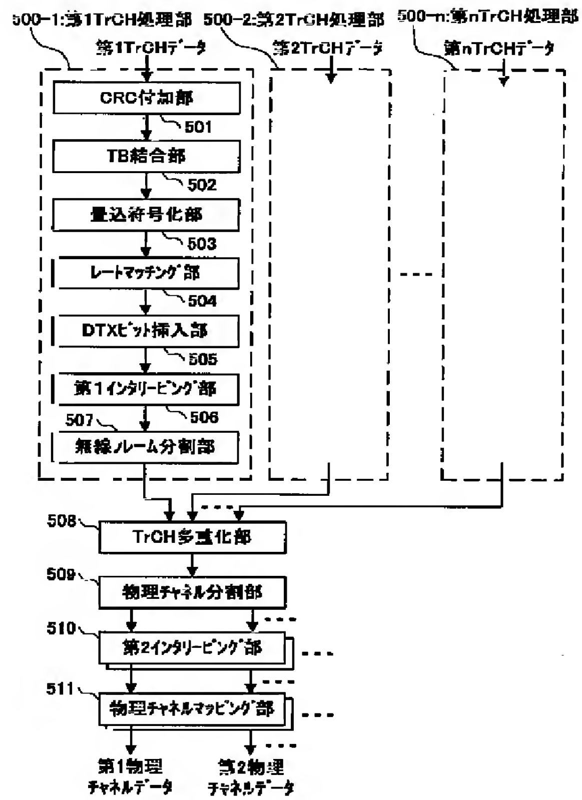
【図4】


(a)
$N_{i,max} \times 3+\Delta N_{i,max}$
レートデマッチング
(b)
DTX
$N_{i,max} \times 3=(N_{i,j} \times 3)+N_{i,DTX}$
DTXビット削除
(c)
$N_{i,j} \times 3$
ビタビ復号
(d)
$N_{i,j}$

【図6】


(a)
$N_{i,j}$
畳込符号化
(R=1/3)
(b)
$N_{i,j} \times 3$
レートマッチング
(c)
$(N_{i,j} \times 3)+\Delta N_{i,j}$
DTXビット挿入
(d)
DTX
$Ni_{,max} \times 3+\Delta N_{i,max}=(N_{i,j} \times 3)+\Delta N_{i,j}+N_{i,DTX}$

【図5】


500-1:第1TrCH処理部
500-2:第2TrCH処理部
500-n:第nTrCH処理部
第1TrCHデータ
第2TrCHデータ
第nTrCHデータ
CRC付加部
501
TB結合部
502
畳込符号化部
503
レートマッチング部
504
DTXビット挿入部
505
第1インタリービング部
506
507
無線フレーム分割部
508
TrCH多重化部
509
物理チャネル分割部
510
第2インタリービング部
511
物理チャネルマッピング部
第1物理
チャネルデータ
第2物理
チャネルデータ